Do Firefighters and Police Officers in the State of Ohio Have a Higher Incidence of Certain Cancer Types Compared to the General Population?

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Abstract

Firefighters and police officers are exposed on a daily basis to several carcinogens and chemicals that can lead to multiple occupational hazards, which increases their risk of cancer. Studies have shown that firefighters are nine percent more likely to get cancer and they have a fourteen percent elevated risk for cancer mortality compared to the general population. Likewise, police officers who served thirty years in Buffalo, New York were shown to have a higher risk for brain cancer and Hodgkin's lymphoma compared to individuals in the tumor registry. However, there is very limited research on cancer incidence in the state of Ohio. The goal of this study is to provide descriptive data about cancer incidence among firefighters and police in Ohio as a first step towards determining whether there is a connection between their occupation and cancer risk. These data were obtained from the Ohio Department of Health's (ODH) Ohio Cancer Incidence Surveillance System (OCISS). In our study, about 1.49 million cancer cases occurred in the state of Ohio from 1996 to 2017 and were analyzed in four separate CSV files. After determining the coding for firefighters and police officers, SAS Studio, RStudio, and ArcGIS Pro were used to determine the demographics and cancer types. There were 2036 firefighters and 3906 police officers in the state of Ohio with some type of cancer. Firefighters and police officers both had a higher incidence of prostate cancer compared to the general population. Furthermore, both occupations had a high incidence of lung and bronchus cancer, colon cancer, and melanoma. The general population had similar results for all other cancer types with the exception of breast cancer, which was higher in the general population than in firefighters and police. The highest incidence of cancer occurred in Cuyahoga County for all three populations. Potential exposure to several carcinogens such as polycyclic aromatic hydrocarbons (PAHs), benzene, and toluene could have increased the risk of cancer among firefighters and police officers. In addition, the

constant stress that firefighters and police officers undergo daily causes excess cytokine release. As a result, immunity is decreased which leads to cancer. The implementation of smoking cessation and nutrition programs as well as further education on using personal protective equipment effectively should be implemented to reduce the burden of disease. Further research should also be done to explore the possibilities of other physical, biological, and chemical agents that increase the risk of cancer among firefighters and police officers.

Introduction

Firefighters in Chicago, San Francisco, and Philadelphia (1950-2009)

The National Institute for Occupational Health and Safety (NIOSH) conducted a study in Chicago, San Francisco, and Philadelphia to determine the standardized incidence ratio (SIR) and standardized mortality ratio (SMR) of different types of cancer (Daniels, et al., 2013). 29993 firefighters who worked between 1950 and 2009 in these cities were assessed using life table methods (Daniels, et al., 2013). The results showed that firefighters were nine percent more likely to get cancer and they had a fourteen percent increased chance of dying due to cancer compared to the general population (Daniels, et al., 2013). Among the 4461 incident cancers and 3285 cancer mortalities reported in the study, there were high ratios of malignant mesothelioma (SIR=2.29; 95% Confidence Interval [CI]: 1.60, 3.19. SMR=2.00; 95% CI: 1.03, 3.49), esophageal (SIR=1.62; 95% CI: 1.31, 2.00. SMR=1.39; 95% CI: 1.14, 1.67), and kidney (SIR=1.27; 95% CI: 1.09, 1.48. SMR=1.29; 95% CI: 1.05, 1.58) cancers (Daniels, et al., 2013). The majority of cancer types associated with firefighters discovered in this study were categorized under oral cavity and respiratory system. On the other hand, little evidence was

discovered for higher incidence rates of brain, lymphohematopoietic, and testicular cancer in firefighters compared to the general population (Daniels, et al., 2013).

Firefighters in the State of California (1988-2007)

A case-control study of cancer risk among firefighters was published in 2015 which determined the odds ratio (OR) of certain cancer types (Tsai, et al., 2015). The researchers obtained their data from the California Cancer Registry (CCR) (Tsai, et al., 2015). From the registry, only male firefighters with cancer were included. The cancer types were divided into cases and controls and were analyzed using SAS (Tsai, et al., 2015). The control cancers in this study included pancreatic (31%), stomach (29%), liver (23%), and pharyngeal (18%) cancers (Tsai, et al., 2015). Using the literature, the control cancer types in this study were defined as the types where there was little correlation between the firefighter occupation and exposure (Tsai, et al., 2015). These data were also divided by race (Tsai, et al., 2015). This study consisted of 3996 firefighters, the majority of which were white (90.2%) (Tsai, et al., 2015). White firefighters had an increased risk of esophagus-adenocarcinoma (OR=1.84; 95% CI: 1.32, 2.56), melanoma (OR=1.71; 95% CI: 1.40, 2.09), and esophageal (OR=1.59; 95% CI: 1.19, 2.12) cancers compared to the control group (Tsai, et al., 2015). However, other races/ethnicities had a higher risk for tongue (OR=3.57; 95% CI: 1.23, 10.35), testicular (OR=3.73; 95% CI: 1.26, 11.02), and bladder (OR=2.37; 95% CI: 1.05, 5.33) cancers (Tsai, et al., 2015) compared to the control group. These observations were similar to Daniels, et al., 2013 which also found that firefighters were at an increased risk of developing kidney and esophageal cancers. In contrast, this study showed a higher risk for non-Hodgkin lymphoma and leukemia for all races as well as testicular cancer, multiple myeloma, and bladder cancer for non-white races/ethnicities (Tsai, et al., 2015). In

addition, Daniels, et al., 2013 showed elevated risks for oral cavity cancer types such as tongue and pharynx as well as digestive system cancer types, including colon cancer in firefighters.

Male Firefighters in Massachusetts (1987-2003)

In the state of Massachusetts, another study was done which looked at the Standardized Morbidity Odds Ratio (SMOR) to determine the risk of certain cancer types among white male firefighters (Kang, Davis, Hunt, & Kriebel, 2008). This study showed a higher risk for colon (SMOR=1.36; 95% CI: 1.04, 1.79) and brain (SMOR=1.90; 95% CI: 1.10, 3.26) cancers in comparison to other occupations as listed in the Massachusetts Cancer Registry (Kang, Davis, Hunt, & Kriebel, 2008). However, there was less evidence for a higher risk of bladder, kidney, and Hodgkin's Lymphoma cancers (Kang, Davis, Hunt, & Kriebel, 2008).

Police Officers in Buffalo, New York (1976-2006)

In addition, a study was conducted between 1976 and 2006 in Buffalo, New York to determine if white male police officers were at a higher risk for developing cancer. Standardized incidence ratios (SIR) were used to determine risk (Gu, Burchfiel, Charles, ME, & Violanti, 2011). Out of the 2234 police officers in this study, 406 officers (18.2%) were diagnosed with cancer (Gu, Burchfiel, Charles, ME, & Violanti, 2011). More specifically, police officers in the study were at a higher risk for Hodgkin's lymphoma (SIR=3.34; 95% CI: 1.22, 7.26) and brain cancer (SIR=1.61; 95% CI: 0.73, 3.05) compared to individuals within the tumor registry of nine US regions who were not diagnosed with these cancer types (Gu, Burchfiel, Charles, ME, & Violanti, 2011).

Epidemiology of Cancer: Police Officers

A descriptive review from fourteen studies was done to summarize the incidence and mortality of different types of cancer in police officers (Wirth, et al., 2012). Published articles were obtained by different online databases such as Web Science and CABDirect up until late 2010 (Wirth, et al., 2012). The results showed that there was a higher mortality risk for colon, kidney, esophagus, digestive system, testis, and male breast cancers compared to other individuals within the online databases who were not diagnosed with these cancers (Wirth, et al., 2012). This study suggested that more research was required to observe the causative agents that made police officers more susceptible to these cancer types (Wirth, et al., 2012).

Firefighters and Police Officers in Tacoma and Seattle, Washington (1974-1989)

The first study that examined the risk of developing cancer without analyzing cancer mortality in firefighters and police was in 1994 (Demers, et al., 1994). This study analyzed 2447 male firefighters and compared the rates of cancer to 1878 police officers and other occupations using a population-based tumor registry (Demers, et al., 1994). Standardized incidence ratio (SIR) and incidence density ratio (IDR) were determined (Demers, et al., 1994). The results showed that firefighters had a higher risk for prostate (SIR=1.4; 95% CI: 1.1, 1.7) and colon (SIR=1.1; 95% CI: 0.7, 1.6) cancers in comparison to the general population (Demers, et al., 1994). However, prostate cancer (IDR=1.1; 95% CI: 0.7, 1.8) was not elevated in police officers compared to firefighters, but the risk of colon cancer (IDR=1.3; 95% CI: 0.6, 3.0) was still high in the occupation (Demers, et al., 1994).

Purpose

Several studies have been done that look at the population of firefighters and police officers individually. These studies were conducted in states such as California, New York, Washington, Illinois, and Pennsylvania. However, to our knowledge, there have not been any studies done on occupational exposure and cancer incidence of police officers and firefighters in the state of Ohio. This study is a descriptive epidemiological study, so key demographic characteristics of cancer were provided for firefighters and police in Ohio. Hypotheses tests were not performed in this study.

Methods

Obtaining the Data

Permission was requested from the ODH in order to access these data. These data were collected by the OCISS and are stored into the secure Ohio Public Health Information Warehouse (ODH, n.d.). Within this warehouse, the dataset titled "Cancer De-Identified Incidence Data (1996-2017)" was utilized. In the state of Ohio, there were 1490169 total cancer cases over the 21 years of data collection. This population was referenced as the "general population" throughout the study.

Analyzing the CSV Files

The maximum capacity for analysis within Microsoft Excel is a little over one million entries. Due to the large number of cancer cases in our study (approximately 1.5 million people), the data was initially divided into four quarters, each including about 372544 cancer cases. The first quarter was closely examined by looking at the occupation (variable name in registry and

Supplemental Tables 1 and 2 = txusualocc) and industry (variable name in registry and Supplemental Table 1 and 2 = txusualind) columns. Throughout these two columns, there were several ways that firefighters and police officers were identified in the data set. Firefighters were entered into the database in several ways including “FIREFIGHTER,” “RETIRED FIREFIGHTER,” and “FIREMAN.” Police was entered as “POLICE OFFICER,” “POLICEMAN,” and “RETIRED POLICEMAN.” In addition, the terms “DEPUTY,” “SHERIFF,” and “SERGEANT” were searched as these are additional ways that police officers were identified in these data. All terms identified in the first and third quarter were applied to the other quarters for firefighters. In police officers, the terms identified in the first quarter only were applied to the other three quarters. Supplemental Table 1 shows the different codes of firefighters from quarters one and three while Supplemental Table 2 shows the various ways that police officers were coded in the first quarter. The terms listed in the Supplemental Tables were applied to different codes on SAS Studio (SAS Software, n.d.).

Coding on SAS and RStudio

After finding the unique ways firefighters and police officers were coded in the occupation and industry columns, the four quarters were recombined and condensed into two halves. The first half (quarters 1 and 2) had 745085 cancer cases and the second half (quarters 3 and 4) had 745084 cases. The two halves were imported to SAS Studio using the PROC IMPORT function. The PROC SQL function was used to obtain the frequencies of different variables including sex, race, ethnicity, insurance type, cancer type (psite = primary site), and histology type ICD-3 for the general population. A different function was then used to filter the firefighter and police officer occupations. In all, 2036 firefighters and 3906 police officers were identified in the whole

database. The PROC SQL function was used again to gather the frequency of the different demographic variables (Table 1) and cancer types within the firefighter and police occupations.

After gathering data from both halves of the firefighters, police officers, and general population, the tables generated by SAS Studio were exported into several CSV files. The files were loaded on to RStudio in order to combine the data from the two halves of SAS Studio into one (RStudio Team, 2020). Each combined dataset from RStudio was converted back to CSV files and used for further analysis.

Recoding Variables from the Combined CSV files

All of the variables were recoded using the Data Dictionary from the North American Association of Central Cancer Registries (NAACCR) (Chapter X: Data Dictionary, n.d.). To recode for the different ICD-O-3 Site (psite) numbers and histology types, a data table from the NIH Surveillance, Epidemiology and End Results Program (SEER) was used as reference (Site Recode ICD-O-3/WHO 2008 Definition*^, n.d.). Furthermore, for any histology type that was not recoded using the reference, the Histology Validation List from SEER was used instead (ICD-0-3 SEER SITE/HISTOLOGY VALIDATION LIST, 2020).

SEER organizes the cancer types into broader organ system categories and within each category, a specific type of cancer is listed. For this study, all the categories were recorded in Figures 1-3. The top 5 categories for each population were extrapolated and within each organ system, the top three specific cancer types were determined (Tables 2-4).

Using ArcGIS Pro

In this study, one of our other goals was to look at cancer incidence across the state of Ohio. In order to do this, the ArcGIS Pro software was used to construct three different maps: cancer frequency among the general population, firefighters, and police officers. The Shapefiles map file was extracted from the United States Census Bureau (United States Census Bureau, 2019). Based on this map, we examined the distribution of cancers across different counties in Ohio.

Results

Demographics - General Population

The total number of cancer cases for Ohio's general population was 1490169 people. About 49% of the cancer cases were male and the other 51% were females (Table 1). It is also important to note that there was a very small population of transsexual individuals. The large majority of individuals in the general population were white (87.9%), followed by black (9.7%). In addition, about 90.6% of the population was non-Hispanic/non-Spanish. The average age for all cancer positives was 65.1 years (Standard Deviation [SD] = 14.9; range = 0 - 116 years; 95% CI = 65.08, 65.13). In the general population, most people had Medicare/Medicaid (48.5%) as their primary insurance followed by private insurance (33.4%). Cancer incidence in Cuyahoga County (12.8%) was reported to be the highest (Table 5). This is closely followed by Franklin County (8.1%) and Hamilton County (7.1%). The distribution of the general population is shown in Figure 4a where it is clear that the majority of Ohioans who have cancer reside in Northeast Ohio.

Demographics - Firefighters

In May 2017, it was reported that about 18670 firefighters were working in Ohio (U.S. Bureau of Labor Statistics, 2017). After coding out all the firefighters from the general population, our study consisted of 2036 firefighters in the state of Ohio. About 1990 (97.7%) of the firefighters were male and the majority were also white (93.6%) (Table 1). In addition, about 93.4% of the firefighters were non-Hispanic/non-Spanish. The average age for firefighters was 65.6 years (SD = 13.6; range = 22–98; 95% CI = 64.97, 66.16). In terms of insurance type, most firefighters had private insurance (39.6%) or Medicare/Medicaid (46.8%). The majority of firefighters who had cancer resided in Cuyahoga County (15.9%) (Table 5). In addition, there was a high cancer incidence among Ohio firefighters in Hamilton County (8.9%) and Franklin County (7.9%). In addition, Figure 4b shows that several counties surrounding Cuyahoga County in Northeast Ohio had a higher incidence of cancer for firefighters.

Demographics - Police Officers

As of May 2017, there were about 24950 police and sheriff's patrol officers working in the state of Ohio (U.S. Bureau of Labor Statistics, 2017). In our study, there were 3906 police officers who had been diagnosed with some type of cancer from 1996-2017. There was a smaller percentage of males in this population (86.2%) compared to firefighters (97.7%) according to Table 1. In addition, about 89.3% of the police were white, followed by black (9.9%). 94.1% of the police were non-Hispanic/non-Spanish. 47.0% of the police had private insurance and 40.3% had Medicare/Medicaid. The average age for police officers was the youngest of the three populations at 62.6 years (SD = 13.3; range = 18-98; 95% CI = 62.21, 63.05). Cuyahoga County had the highest incidence of cancer (17.0%) among all police officers in Ohio (Table 5). Franklin

County (7.0%) and Hamilton County (6.2%) also had a high incidence of cancer. Figure 4c shows the incidence of cancer in police officers throughout all 88 counties of Ohio. There is a high concentration of cancer in the counties of Northeast Ohio.

Organ Systems and Cancer Types

In Figure 1, the incidence for cancer categories among the general population is shown. The top 5 cancer systems are the digestive system (n=264812, 17.8%), breast (n=241746, 16.2%), respiratory system (n=235202, 15.8%), male genital system (n=186181, 12.5%), and urinary system (n=113805, 7.6%). According to Table 2, the top cancer type for each system respectively was colon (n=110525, 7.4%), breast (n=241746, 16.2%), lung and bronchus (n=215369, 14.5%), prostate (n=177261, 11.9%), and urinary bladder (n=65198, 4.4%).

In Figure 2, the cancer incidence for the firefighter population was reported. The most prevalent cancer systems were the male genital system (n=572, n=28.1%), digestive system (n=353, 17.3%), respiratory system (n=306, 15.0%), urinary system (n=205, 10.1%), and skin excluding basal and squamous (n=144, 7.1%). As shown in Table 3, the top cancer respectively for each organ system was prostate (n=540, 26.5%), colon (n=139, 6.8%), lung and bronchus (n=272, 13.4%), urinary bladder (n=119, 5.8%), and melanoma (n=135, 6.6%).

The incidence for the different cancer systems among police officers in the state of Ohio are shown in Figure 3. The top 5 cancer systems in police officers as shown in Table 4 are the male genital system (n=801, 20.5%), digestive system (n=747, 19.1%), respiratory system (n=680, 17.4%), urinary system (n=397, 10.2%), and skin excluding basal and squamous (n=224, 5.7%). The top specific cancer type for each of these systems respectively are prostate (n=744, 19.0%),

colon (n=246, 6.3%), lung and bronchus (n=619, 15.8%), urinary bladder (n=212, 5.4%), and melanoma (n=210, 5.4%) (Table 4).

Discussion

The primary motivation for this study was to describe cancer incidence in two key occupations, firefighters and police officers, and compare the incidence in these occupations to the general population using a cancer registry. Our study had 1490169 cancer cases in the state of Ohio, and within that there were 2036 firefighters and 3906 police officers. As mentioned earlier, our research was a descriptive epidemiological study, so no hypotheses tests were performed. The results showed that prostate cancer was the most prevalent cancer among firefighters (n=540, 26.5%) and police officers (n=744, 19.0%). In addition, firefighters and police had a high incidence of lung and bronchus cancer (firefighters: n=272, 13.4%; police: n=619, 15.8%), colon cancer (firefighters: n=139, 6.8%; police: n=246, 6.3%), and melanoma (firefighters: n=135, 6.6%; police: n=210, 5.4%). In the general population, breast cancer had the highest incidence (n=241746, 16.2%). This was closely followed by lung and bronchus cancer (n=215369, 14.5%), prostate cancer (n=177261, 11.9%), and colon cancer (n=110525, 7.4%).

All three populations had the highest incidence of cancer in Cuyahoga County. Franklin County was the second highest among police officers and the general population, while Hamilton County was ranked second among firefighters. Generally speaking, Northeast Ohio had a higher incidence of cancer compared to other areas in the state. There are a few possible reasons why Cuyahoga County and Northeast Ohio had the highest incidence of cancer in addition to the fact that it is the second largest county by population in Ohio behind Franklin County (Ohio Demographics by Cubit, 2020). One reason could be due to the fact that the drinking water in

Northeast Ohio has higher levels of hexavalent chromium (McCarty, 2016). Research has shown that hexavalent chromium has very strong oxidative properties and exposure to this chemical can lead to higher rates of lung cancer (National Toxicology Program, n.d.) (Reports, 2018). In addition, Northeast Ohio has higher ambient air concentration of particulate matter due to the burning of fossil fuels in factories (Higgs, 2020). The Environmental Protection Agency national ambient air quality standard for annual fine particulate matter concentration is 12 $\mu g/m^3$, but the concentration in Cleveland was 40 $\mu g/m^3$ in 2019 (Higgs, 2020). A meta-analysis was done examining the relative risk (RR) of lung cancer due to exposure of fine particulate matter ($PM_{2.5}$) and coarse particulate matter (PM_{10}) (Ciabattini, Rizzello, Lucaroni, Palombi, & Boffetta, 2020). The results showed that an increase in 10 $\mu g/m^3$ of $PM_{2.5}$ and PM_{10} caused an increased risk of lung cancer ($PM_{2.5}$: RR=1.16; 95% CI: 1.09, 1.23. PM_{10}: RR=1.23; 95% CI: 1.05, 1.40) (Ciabattini, Rizzello, Lucaroni, Palombi, & Boffetta, 2020). With this knowledge, it is possible that the elevated particulate matter in Northeast Ohio contributed to the increased incidence of cancer observed in this region.

Overall, the trends of cancer type among the three populations were very similar with some slight differences. Firefighters and police officers had a relatively similar incidence of the same cancer types: prostate, lung and bronchus, colon, and melanoma. The general population also had prostate, lung and bronchus, and colon cancer, but breast cancer was the most common. The differences in these observations can be attributed to the fact that most firefighters and police officers in our study were male and breast cancer is not common among males. Thus, there was not a high incidence of breast cancer in police and firefighters.

Our results showed that both firefighters and police officers had the highest incidence of prostate cancer. The results from our study were mostly similar to some of the studies done earlier.

Several of the studies done on cancer risk for firefighters and police officers used data from a registry system similar to our study. In addition, our findings were similar to the Daniels, et al., 2013 study, which showed that 716 out of 4461 (16.1%) firefighters in Chicago, San Francisco, and Philadelphia had lung cancer. Our study had a slightly lower incidence of lung cancer in firefighters (n=272, 13.4%). The Massachusetts study (Kang, Davis, Hunt, & Kriebel, 2008) also showed that firefighters were at a higher risk for colon cancer compared to other occupations which we did not observe in our study. Our results differed from the police officer study done in Buffalo, New York (Gu, Burchfiel, Charles, ME, & Violanti, 2011) since their results showed that police officers had a higher risk for brain cancer and Hodgkin's lymphoma compared to individuals within the tumor registry. We did not observe a high incidence of brain or Hodgkin's lymphoma in our study. In addition, the (Demers, et al., 1994) study showed that firefighters were at an increased risk for prostate cancer in comparison to police officers and the general population in the population-based tumor registry.

Prostate cancer, a type of cancer that occurs in men, has a very similar incidence among all three populations when only considering males (firefighters=27.1%; police officers=22.0%; general population=24.3%). Firefighters and police are exposed to several chemicals and carcinogens that can cause mutations in genes (Curtis, n.d.). These mutations will cause growths in cancer cells and these cells will multiply (Curtis, n.d.). Some carcinogens that firefighters and police officers are exposed to include 1,3-butadiene, formaldehyde, benzene, and asbestos, all of which are chemicals that originate from fire and smoke (Sritharan, et al., 2017). In addition, some firefighters and police officers are also exposed to particulate matter, NO_2, and other air pollutants that can increase their risk of developing prostate cancer (Sritharan, et al., 2017). Each day, firefighters and police officers have to perform laborious tasks under a lot of stress. The

stress accumulated during their occupation reduces immunity and causes high cytokine secretion (Sritharan, et al., 2017). There are some unique reasons why police officers alone could be at an increased risk for prostate cancer. Researchers from the Université du Québec found that police officers undergo whole body vibration (WBV) which is when mechanical energy is moved to the human body (MacLean, 2016). Some of the vibrations could possibly originate from the diesel exhaust and engine emissions (MacLean, 2016). As a result, the prostate gland can get inflamed (MacLean, 2016). Furthermore, police officers are known to work during different times of the day including night shifts (Allen, n.d.). The disruption in their circadian rhythms can reduce the amount of melatonin which can negatively impact the function of hormones that regulate the prostate gland (Allen, n.d.).

In addition to prostate cancer, firefighters and police officers have a very high incidence of lung and bronchus cancer. Unlike prostate cancer, this cancer can occur in both men and women. In our study, 13.4% of firefighters, 15.8% of police officers, and 14.4% of the general population had lung and bronchus cancer. One reason that firefighters had a lower incidence of lung and bronchus cancer is because many firefighters do not spend a significant time daily fighting fires (Powell, 2017). Thus, being exposed to fires for a shorter duration leads to a lower risk of getting lung and bronchus cancer (Powell, 2017). However, firefighters still have a risk of lung cancer risk due to exposure of polycyclic aromatic hydrocarbons (PAHs) (McGregor, 2007, p. 5). PAHs and nitro-PAHs can also lead to increased risk of urinary bladder and skin cancer (the fourth and fifth most prevalent cancers in our study) (McGregor, 2007, p. 5). For police officers, a lot of risk factors are due to lifestyle habits. A major risk factor of lung cancer is smoking. About 40% of police officers are smokers (Police Health, n.d.). However, the smoking rates for firefighters was about 13.6% (Haddock, Jitnarin, Poston, Tuley, & Jahnke, 2018). In addition to smoking

more than the general population, they also consume tobacco and drink alcohol at a much higher rate (Smith, Devine, Leggat, & Ishitake, 2005). Furthermore, while firefighters and police officers are both called to the scene of a fire, firefighters wear personal protective equipment (PPE) while police officers will rarely wear PPE (Melnikova, Wu, Yang, & Orr, 2018). As a result, firefighters are able to better protect themselves against inhaled chemicals and particles compared to police officers (Melnikova, Wu, Yang, & Orr, 2018).

The third most prevalent cancer in our study was colon cancer. The incidence for colon cancer in Ohio was 6.8% for firefighters, 6.3% for police officers, and 7.4% for the general population. Colon cancer was the third most prevalent cancer among firefighters and police officers. After a person turns 50 years old, colon cancer becomes more prevalent, and the cancer develops due to abnormal tissue growth known as polyps (Bergman & Basri, 2010). Firefighters are exposed to carcinogens such as benzene which increase their risk for colon cancer (McGregor, 2007, p. 4). In fact, a study done in Montréal showed that the odds ratio due to high exposure of benzene was 1.9 (McGregor, 2007, p. 4). In addition to benzene, exposure to toluene and xylene have also been examined (McGregor, 2007, p. 5). Furthermore, like prostate and lung and bronchus cancers, PAHs are also a risk factor for colon cancer (McGregor, 2007, p. 5). In addition to the exposure of chemical agents and carcinogens, the lifestyle of firefighters and police officers have also played an essential role in the prevalence of colon cancer. Smoking and decreased physical activity have been a contributing factor to colon cancer (Wirth, et al., 2012). Furthermore, it has been said that excess meat consumption can also increase the risk of colon cancer (McGregor, 2007, p. 5).

One limitation in our study occurred from the fact that firefighters were coded in many different ways. As a result, some firefighters could have been missed from the raw dataset. In addition to

firefighters, police officers were coded in many different ways in the raw dataset (i.e. deputy, sheriff, sergeant) so some police officers could have also been missed. The codes used in SAS Studio were from quarter one only (police officers) and quarters one and three (firefighters). As a result, more individuals were likely to be missed from the other quarters. Another error occurred when coding for the specific types of cancer. Due to the constant updates of the cancer categories as well as the subtle differences between SEER and the validation list, there may have been a few individuals that were not coded correctly. Also, there were inconsistencies when deciding whether or not to include certain individuals in our study. To clarify, one occupation would list an individual working for a certain fire department and the next column would say "unknown." In order to keep things consistent, we did not include these individuals in our study. Our study also recognizes the fact that the results reported were unadjusted for age. Furthermore, our study recognizes that smoking, alcohol consumption, and diet can be a risk factor for cancer. However, our data did not have these three variables, so it was not possible to examine these risk factors.

Conclusion

The results from our study showed that prostate, lung and bronchus, and colon cancer were the three most incident cancer types among firefighters and police officers over this 21-year span from 1996 to 2017. These results were different than the general population in the fact that breast cancer was the most common cancer in the general population of Ohio. These differences can be explained by the fact that firefighters and police officers did not have a lot of women in these occupations during this timeframe. Further examination of these results should be performed in the future to determine if there are other chemical, biological, or physical agents that cause an increased risk to these cancer types. Studies in the future should also examine risk factors for the high incidence of cancer in Northeast Ohio. In addition, hypothesis tests can be performed to

detect any statistical significance in these data. Educating firefighters and police officers about safe work practices including correct utilization of oxygen tanks and other protective gear is extremely important so that we can decrease the incidence of different cancer types (CDC, 2016). Also, smoking cessation and nutrition and exercise programs can be extremely beneficial to firefighters and police officers to reduce their risk of developing cancer.

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Appendix

Table 1 – Demographic characteristics of cancer cases among the general population, firefighters and police officers reported to the Ohio Cancer Incidence Surveillance System from 1996 to 2017

	General Population	Firefighters	Police Officers
Number of Individuals	1490169	2036	3906
Male sex, No. (%)*	729885 (49.0%)	1990 (97.7%)	3366 (86.2%)
Race, No. (%)			
White	1310394 (87.9%)	1906 (93.6%)	3487 (89.3%)
Black	144182 (9.7%)	120 (4.1%)	386 (9.9%)
Other	15799 (1.1%)	3 (0.1%)	21 (0.5%)
Unknown	19794 (1.3%)	7 (0.3%)	12 (0.3%)
Age (years), Mean (SD)	65.1 (14.9)	65.6 (13.6)	62.6 (13.3)
Hispanic, No. (%)			
Non-Hispanic/Non-Spanish	1349801 (90.6%)	1902 (93.4%)	3677 (94.1%)
Mexican/Spanish/Hispanic/Latino	6776 (0.5%)	4 (0.2%)	12 (0.4%)
Other	2450 (0.2%)	1 (0.05%)	4 (0.1%)
Unknown	131142 (8.8%)	129 (6.3%)	213 (5.5%)
Insurance Type, No. (%)			
Uninsured	43891 (2.9%)	19 (0.9%)	49 (1.3%)
Insured/Private Insurance	497990 (33.4%)	806 (39.6%)	1836 (47.0%)
Medicare/Medicaid	723152 (48.5%)	954 (46.8%)	1573 (40.3%)
Other	15200 (1.0%)	15 (0.7%)	44 (1.1%)
Unknown	209936 (14.1%)	242 (11.9%)	404 (10.3%)

*Other sexes include female (760210 people), other (38 people), transsexual (15 people), and unknown (21 people)

Table 2 – Top five cancer systems with the top three cancer types from each system among the general population reported to the Ohio Cancer Incidence Surveillance System from 1996 to 2017			
General Population (n=1490169)			
Top 3 within the Top 5 (n, %)	1**	2**	3**
Digestive System (264812, 17.8)	Colon (110525, 7.4)	Rectum (45946, 3.1)	Pancreatic (35331, 2.4)
Breast (241746, 16.2)	Breast (241746, 16.2)		
Respiratory System (235202, 15.8)	Lung and Bronchus (215369, 14.5)	Larynx (13989, 0.9)	Pleura (2567, 0.2)
Male Genital System (186181, 12.5)	Prostate (177261, 11.9)	Testicular (7123, 0.5)	Penile (1501, 0.1)
Urinary System (113805, 7.6)	Urinary Bladder (65198, 4.4)	Kidney and Renal Pelvis (45388, 3.0)	Ureter (2377, 0.2)

** The percentages are reported from the entire cancer pool, not the system cancer

Table 3 - Top five cancer systems with the top three cancer types from each system among firefighters reported to the Ohio Cancer Incidence Surveillance System from 1996 to 2017			
Firefighters (n=2036)			
Top 3 within the Top 5 (n, %)	1**	2**	3**
Male Genital System (572, 28.1)	Prostate (540, 26.5)	Testicular (27, 1.3)	Penile (3, 0.1)
Digestive System (353, 17.3)	Colon (139, 6.8)	Rectum (58, 2.8)	Esophageal (45, 2.2)
Respiratory System (306, 15.0)	Lung and Bronchus (272, 13.4)	Larynx (23, 1.1)	Pleura (8, 0.4)
Urinary System (205, 10.1)	Urinary Bladder (119, 5.8)	Kidney and Renal Pelvis (83, 4.1)	Ureter (2, 0.1)
Skin excluding Basal and Squamous (144, 7.1)	Melanoma (135, 6.6)	Other Non-Epithelial Skin (9, 0.4)	

** The percentages are reported from the entire cancer pool, not the system cancer

Table 4 - Top five cancer systems with the top three cancer types from each system among police officers reported to the Ohio Cancer Incidence Surveillance System from 1996 to 2017			
Police (n=3906)			
Top 3 within the Top 5 (n, %)	1**	2**	3**
Male Genital System (801, 20.5)	Prostate (744, 19.0)	Testicular (49, 1.3)	Penile (7, 0.2)
Digestive System (747, 19.1)	Colon (246, 6.3)	Pancreatic (130, 3.3)	Rectum (120, 3.1)
Respiratory System (680, 17.4)	Lung and Bronchus (619, 15.8)	Larynx (49, 1.3)	Pleura (5, 0.1)
Urinary System (397, 10.2)	Urinary Bladder (212, 5.4)	Kidney and Renal Pelvis (170, 4.4)	Ureter (10, 0.3)
Skin excluding Basal and Squamous (224, 5.7)	Melanoma (210, 5.4)	Other Non-Epithelial Skin (14, 0.4)	

** The percentages are reported from the entire cancer pool, not the system cancer

Table 5 – Cancer incidence for the top five counties among the general population, firefighters and police officers reported to the Ohio Cancer Incidence Surveillance System from 1996 to 2017			
Top 5 Counties for Each Population (n, %)	Firefighters (n=2036)	Police Officers (n=3906)	General Population*** (n=1490169)
1	Cuyahoga (324, 15.9)	Cuyahoga (664, 17.0)	Cuyahoga (190900, 12.8)
2	Hamilton (182, 8.9)	Franklin (275, 7.0)	Franklin (121333, 8.1)
3	Franklin (161, 7.9)	Hamilton (243, 6.2)	Hamilton (105828, 7.1)
4	Summit (130, 6.4)	Summit (232, 5.9)	Montgomery (73365, 4.9)
5	Lucas (110, 5.4)	Lucas (164, 4.2)	Summit (72088, 4.8)

***70 people are missing

Figure 1 – Distribution of cancer systems among the general population (n=1490169)

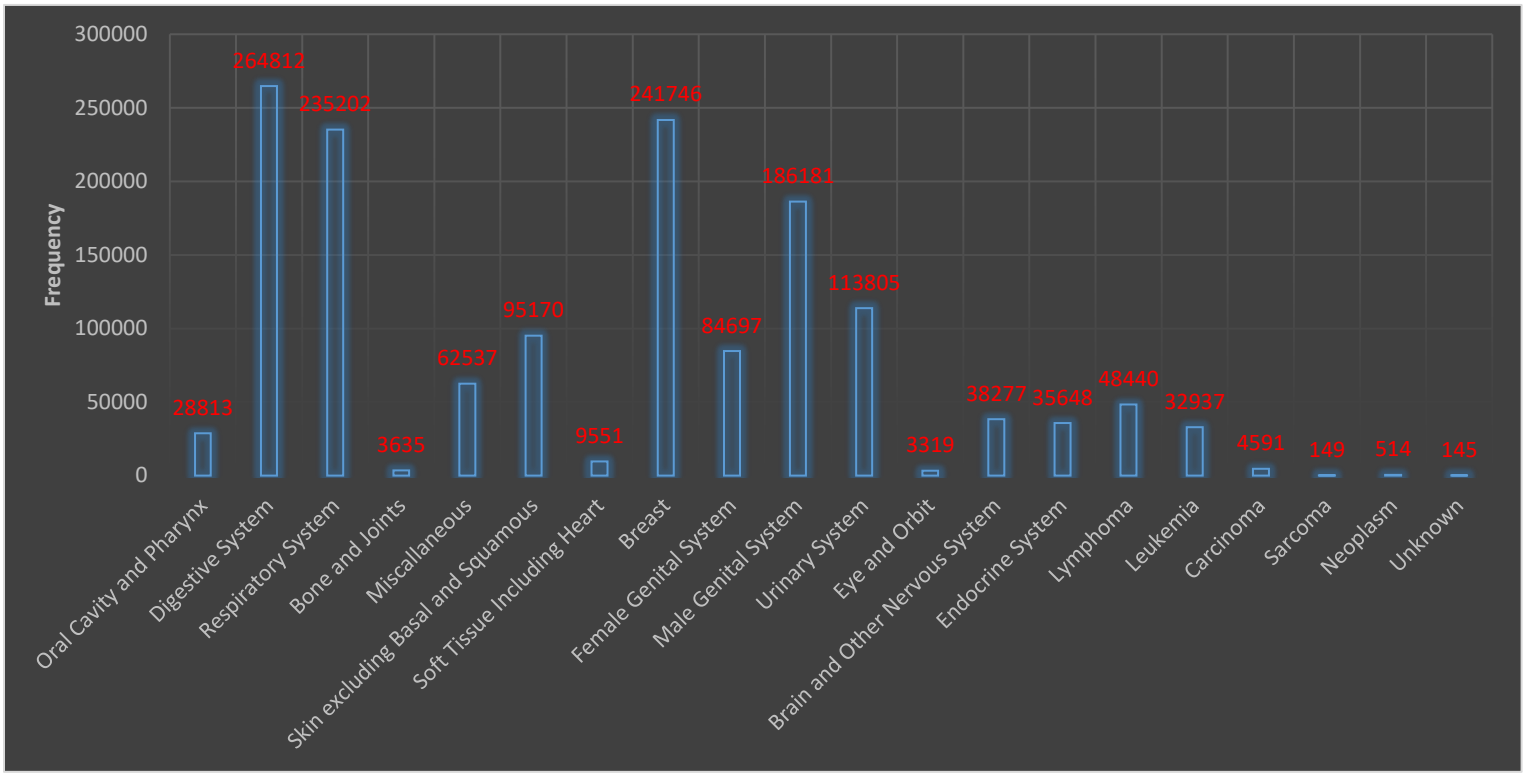


Figure 2 - Distribution of cancer systems among firefighters (n=2036)

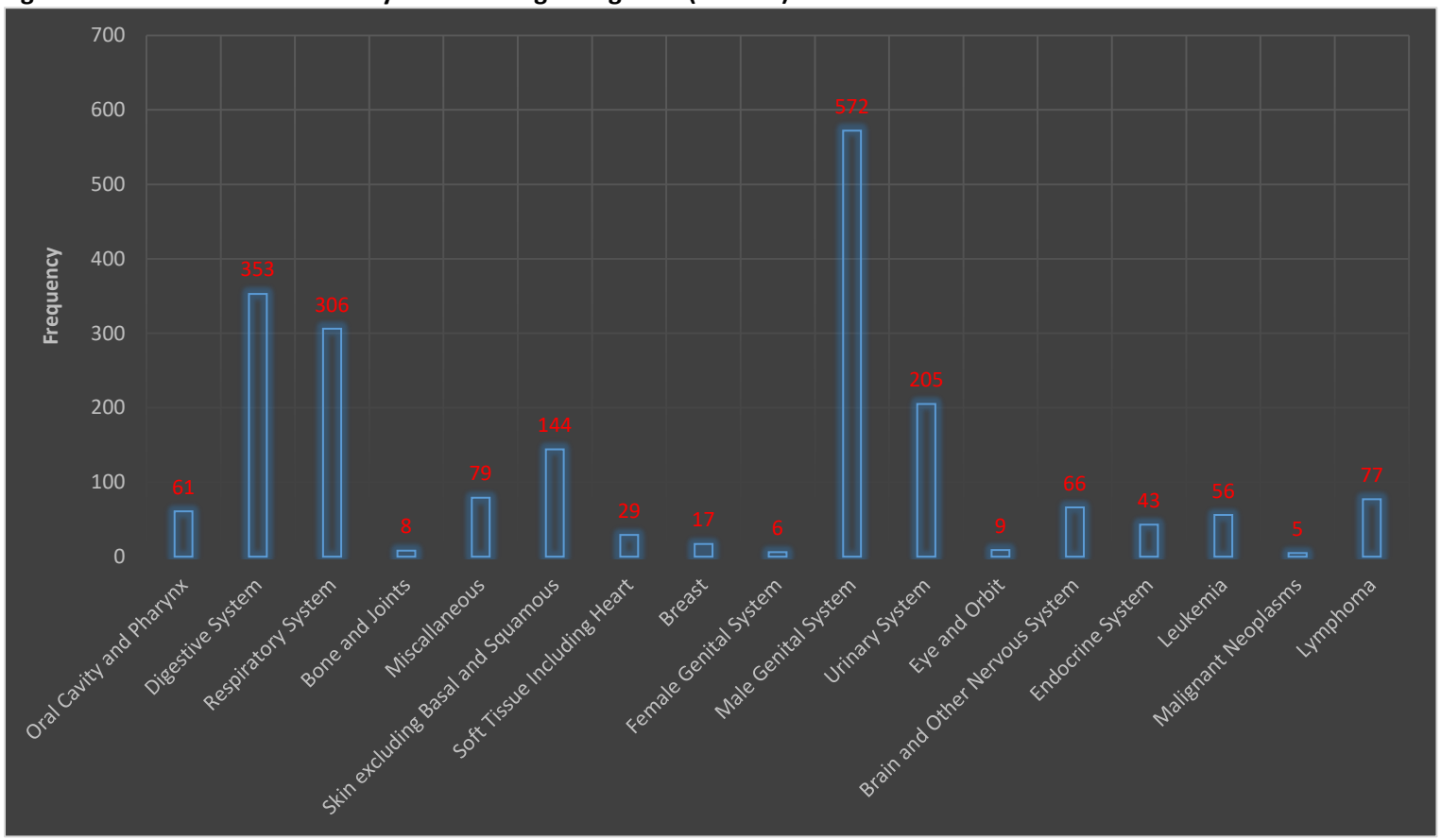


Figure 3 - Distribution of cancer systems among police officers (n=3906)

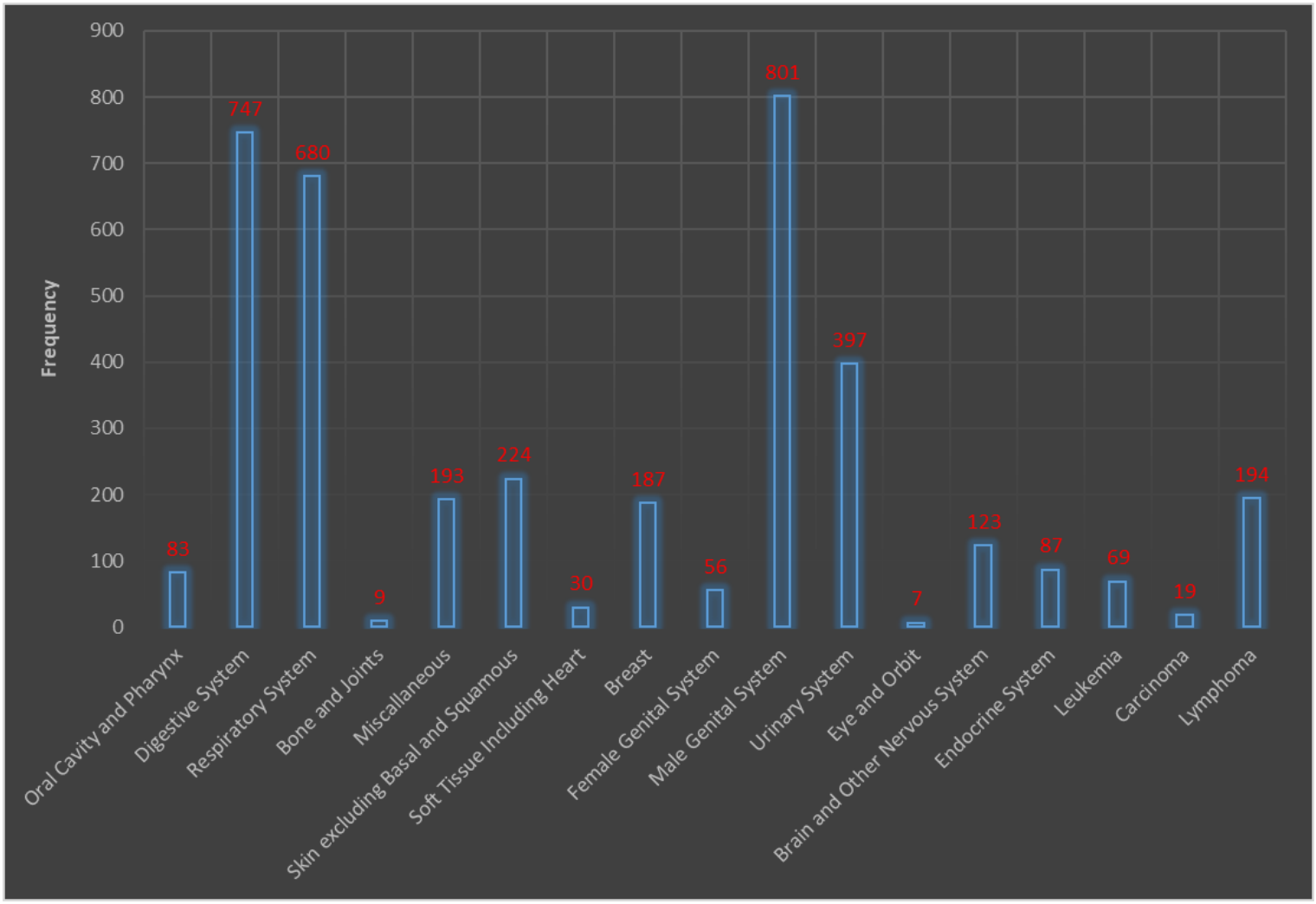
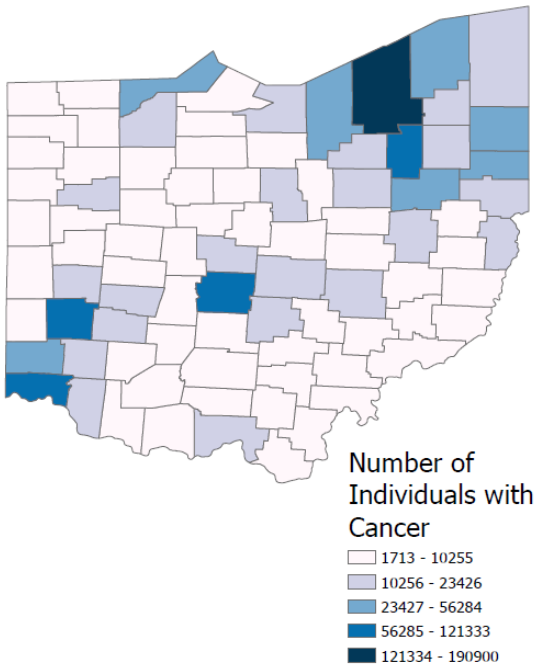
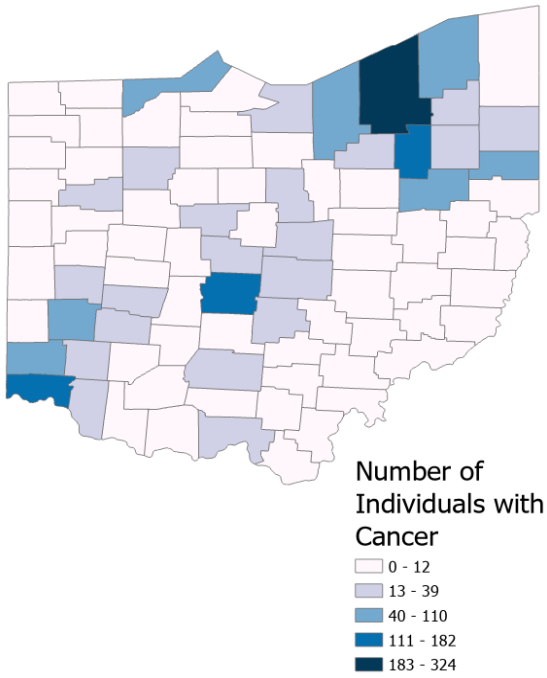


Figure 4 – Geographic distribution of cancer cases in Ohio

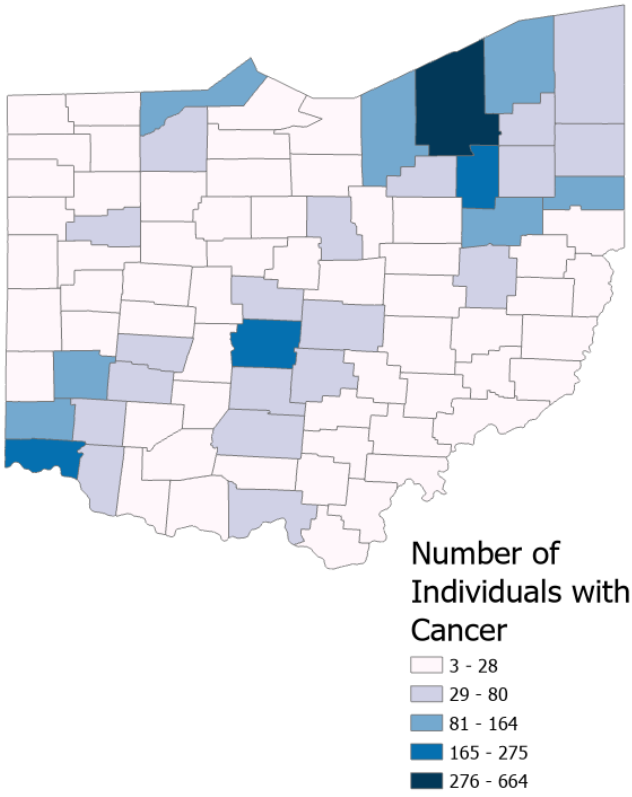
(a) General Population* (n=1490169)**



(b) Firefighters (n=2036)



(c) Police Officers (n=3906)



***70 people are missing

Supplemental Table 1 – Firefighter codes from CSV files	
Txusualocc Column	Txusualind Column
FIRE FIGHTER	CLEVELAND FIRE DEPARTMENT
Longest: FIREMAN	POLICE & FIRE
RETIRED FIREMAN	Fire Department
RETIRED FIREFIGHTER	20 years as a fireman
RET: SANDUSKY FIRE DEPARTMENT	CITY OF CLEVELAND FIRE DEPARTMENT
CITY GOVERNMENT (FIRE OR POLICE)	fireman
FIREMAN/232-9988	WARREN FIRE DEPARTMENT
RETIRED/FIREMAN	FIREFIGHTER/CHEMICAL TANK TRUCK
FIREFIGHTER/CITY OF SHAKER HTS FIRE	DRIVER
DEPT	firefighter
FIREFIGHTER/PARAMEDIC	Fire Service
FIREFIGHTER CAPTAIN	CLEVELAND FIRE DEPARTMENT
N.B.FIRE DEPT-FI	FIREMAN
FIRE DEPT	FIREFIGHTER
Fire Chief	CITY OF DAYTON - FIREFIGHTER
FIRE CHIEF	CENTRAL JOINT FIRE DEPARTMENT
Military/mechanic/fire chief	FIRE FIGHTER/RETIRED
Fireman/Truck Driver	CLEVELAND DIVISION OF FIRE
RETIRED FIRE FIGHTER	WYANDOT EAST FIRE DISTRICT, NEVADA
ASSISTANT FIRE CHIEF	OHIO
retired firefighter	RETIRED-35 YRS-FIRE AND RESCUE
FIREFIGHTER & EMT	OHIO POLICE & FIRE
RETIRED/FIREFIGHTER	AKRON STANDARD / TRI COMMUNITY
PARAMEDIC/FIREFIGHTER	FIRE DEPT
FIRE DEPT INSPECTOR	FIRE FIGHTER
CITY OF CLEVELAND FIRE DEPT	CITY OF WHITEHALL FIRE DEPARTMENT
CAR SALES/FIREMAN	MIDDLETOWN FIRE DEPARTMENT
OPERATOR/ FIRE DEPT	FIREFIGHTERS
RETIRED/FIREFIGHTERS	PUBLIC FIRE AND SAFETY
FIREMAN, CAPTAIN [RETIRED]	FIRE CHIEF
ASST FIRE CHIEF	CITY FIRE DEPARTMENT
LIEUTENANT OF FIRE DEPARTMENT	PLEASANT VALLEY FIRE
COLUMBUS DIVISION OF FIRE	FIREFIGHTING
Fireman; EMT;	CITY FIRE DEPT
FIREFIGHTER/EMS	FIREHOUSE (1)
firefighter	City of Sandusky Fire Department - retired 1991
BOILER FIREMAN	Fire Fighter
CITY FIREMAN	FIRE DEPARTMENT
FIREMAN/CITY OF CLEVELAND	FIRE DEPT/US POSTAL SERVICES
WORK AT FIRER DEPARTMENT	FIRE DEPT
CHIEF FIREMAN-HUBBARD FIRE DEPT	
CAPTAIN	
RETIRED FIRE CHIEF	
FIRE ASST. CHIEF-CITY OF PARMA	
Retired Firefighter	
Fireman	
Firefighter	
Fire Fighter	

FIREFIGHTER/CITY OF PARMA FIREMAN- RETIRED LIMA FIRE DEPARTMENT FIREMAN (RETIRED) BASIL FIRE FIRE INSTRUCTOR MEDIC/FIREFIGHTER-CITY OF DAYTON EMT/FIREFIGHTER FIRE DEPARTMENT FIREFIGHTER (AKRON CITY FIRE DEPT.) FIREMAN & EMS RETIRED - CANTON FIRE DEPT FIREFIGHTER-CITY OF MAYFIELD HEIGHTS Fire fighter; EMT FIREFIGHTER (CITY OF CLEVELAND) RETIRED - FIREFIGHTER FIREMAN AT AIR FORCE/ THEN FORD FIREMAN - RETIRED; MACHINE WORKER - RETI SOUTH EUCID FIRE DEPARTMENT SENIOR FIREFIGHTER FIREFIGHTER; EMT FIRE FIGHTE RETIRED/FIRE CHIEF FIREMAN/PARAMEDIC - RETIRED RETIRED COLUMBUS FIRE DEPT FINDLAY FIRE DEPT CINCINNATI FIRE FIGHTER FIREMAN/EMS RET: FIREMAN FIREMAN/KENT CITY FIRE DEPARTMENT CURRENT: FIREMAN ASHLAND CITY FIRE DEPARTMENT FIREFIGHTER - RETIRED BLOOM TWP FIRE DEPT SAFETY OFFICER FIREMAN CAPTAIN FIREFIGHTER AND FACTORY WORKER MMH - ALSO WORKS AS A FIREMAN FIREFIGHTER/ACCOUNTANT FIREFIGHTER, RETIRED QA: RETIRED FIREMAN FIRE DAMAGE RETIRED - FIREMAN - CITY OF CUYAHOGA FAL FIREFIGHTER/CITY OF FINDLEY FIRE CAPTAIN FIREFIGHTER & MEDIC POLICE/FIRE PARAMEDIC FIREMAN	

FIRE FIGHTER PARAMEDIC	
RETIRED FIRE CHIEF, INDUSTRIAL HYGIENEST	
Retired Fireman	
WORK FOR FIRE DEPT	
FIREMAN/AVON LAKE FIRE DEPARTMENT	
FIREFIGHTER/BOARDMAN BOARD OF EDUCATION	
RETIRED FIRE CAPTAIN (CITY OF LAKEWOOD)	
RETIRED FIREMAN/EMT	
CLEVELAND FIREFIGHTER	
RN/FIREFIGHTER	
FIREFIGHTER AND PARAMEDIC	
FIREFIGHTER/RANGER	
RETIRED-FIREFIGHTER	
ASSISTANT STATE FIRE MARSHALL	
RETIRED FIREMAN OR FARMER	
FIREMAN/ELECTRICIAN	
RETIRED - JACKSON TOWNSHIP - FIRE FIGHTER	
DISPATCHER/FIREFIGHTER	
CLEVELAND FIREMAN	
RETIRED FIREFIGHTER/DRIVER	
FIRE MAN	
AIRPORT FIREFIGHTER	
NOT EMPLOYED, RETIRED POLICE/FIRE	
STATE FIRE MARSHALL	
STATIONARY FIREMAN	
FIREFIGHTER, TOLEDO FIREFIGHTERS UNION	
POLICE AND FIREMAN, RETIRED	
SPFLD FIRE DEPT RETIRED	
FIREMAN/PARAMEDIC	
FIREMAN & BRIDGESTONE NOS	
FIRE DEPT	
POLICE/FIRE/DISPATCH	
FIREFIGHTER/EMT	
BATTALION CHIEF	
PARAMEDIC / FIREFIGHTER	
FIREFIGHTER-CITY OF STRONGSVILLE	
WORK AT ELYRIA FIRE DEPT AS A FIREFIGHTER	
FIRE FIGHTER/PARAMEDIC	
DEPUTY FIRE CHIEF	
FIREFIGHETER	
RETIRED FROM WORTHINGTON FIRE AS A FIREM	
FIRE FIGHTER & DISPATCHER	
FIRE FIGHTER LIEUTENANT	
FIREMAN-MEDIC AND ER NURSE	

TOLEDO FIRE DEPARTMENT RETIRED FIRE FIGHTER AND PARAMEDIC FIREFIGHTER/EMG 05 FIREFIGHTER 911 DISPATCHER POLICE/FIRE DEPT BRICKLAYER, FIREFIGHTER/PARAMEDIC CHIEF FIREFIGHTER CITY OF TOLEDO FIRE DEPT CITY OF TOLEDO, FIREFIGHTER CLARK/FIRE DEPT-LIBERTY TOWNSHIP COLUMBUS FIREFIGHTER CUSTODIAN, RETIRED FIRE FIGHTER DAYTON FIRE & RESCUE DAYTON FIRE DEPT DAYTON FIREFIGHTER,RETIRED DISTRICT CHIEF/FIREFIGHTER EMT FIREMAN EMT FOR FIRE DEPT. EMT/FIREFIGHTER & CIRCUS ENTERTAINER ENGINEER/FIRE FIGHTER Fire Chief for the city of Middletown, OH | Fire Fighter FIRE DEPARTMENT / RETIRED FIRE DEPARTMENT, CITY OF SPRINGFIELD OHIO FIRE DEPT FIRE DEPT (RETIRED) FIRE EMS FIRE FIGHTER (RETIRED) FIRE FIGHTER CAPTAIN fire fighter x 19 yrs FIRE FIGHTER/BUS DRIVER FIRE FOE CORP./GIRARD, OH FIRE RIGHTER/ EMT FIRE/MEDIC FIRECHIEF FIREFIGHTER – CHIEF FIREFIGHTER - CITY OF MASSILLON FIREFIGHTER RETIRED FIREFIGHTER (FORMER FIREFIGHTER AND EMT FIREFIGHTER FOR 29 YRS/ HELICOPTER PILOT FIREFIGHTER PARAMEDIC FIREFIGHTER, RETIRED	

FIREFIGHTER/MEDIC FIREFIGHTER/NURSE FIREFIGHTER/OARAMADIC FIREFIGHTER/PARA FIREFIGHTER/paramedic FIREFIGHTER/PARAMEDIC AT CITY OF XENIA FIREFIGHTER/PARAMEDIC/RN FireFighter: currently stated as retired FIREFIGHTING OCCUPATIONS FIREFIGHTING OCCUPATIONS-RETIRED FIREMAN – retired Fireman – Retired FIREMAN-RETIRED FIREMAN/CAPTAIN FIREMAN/CUSTODIAN FIREMAN/ESTIMATOR FIREMAN/PARAMEDIC FIREMAN/RETIRED FIREMAN-RETIRED 1965MACHINIST AT A PLAS FIREMEN FIRESTATION CAPTAIN FIRFIGHTER LIMA FIRE DEPARTMENT LIMA FIRE DEPARTMENT – RETIRED NOT EMPLOYED, FORMER FIREFIGHTER NOT EMPLOYED, FORMER FIRE CHIEF (FIREMAN NOT STATEDNOT STATEDFIRE CHIEFOWNER/OPER POLICE/FIREMAN QA: FIREFIGHTER RETI Current: FIREFIGHTER RETI RETIRED - CITY OF CANTON FIREFIGHTER | CITY FIREFIGHTER RETIRED - FIRE CHIEF RETIRED – FIREMAN RETIRED FIRE CAPTAIN retired fire chief Retired Firefighter- City of Dayton Retired Firefighter parametic-westerville RETIRED FROM FIRE DEPARTMENT	

RETIRED TEACHER, FIRE FIGHTER, AND FARMER RETIRED, FIREFIGHTER RETIRED-FIREMAN SHERIFF/FIREFIGHTER/FIREARM INSTRUCTOR TOLEDO FIRE DEPT TOLEDO FIREFIGHTER UNKNOWN | FIRE DEPT WORKS FOR LIMA FIRE DEPARTMENT	

Supplemental Table 2 – Police officer codes from CSV files	
Txusualocc Column	Txusualind Column
POLICE RETIRED	POLICE OFFICER
POLICE	CLEVE POLICE DEPT
POLICE OFFICER	POLICE/FIRE
POLICE OFFICER/CONSTRUCTION	POLICE
RETIRED POLICEMAN	POLICE & FIRE
POLICEMAN	MAYFIELD HTS POLICE DEPT.
RETIRED FROM CINCINNATI POLICE DEPT.	COUNTY SHERIFF OFFICE
5 POLICEMAN	PO CTY SHERIFF DEPT.
SAFETY OFFICER	POLICEMAN
DISABLED POLICE OFFICER	CLEVELAND POLICE DEPARTMENT
Police officer	RETIRED POLICEMAN
POLICE OFFICER/NORFOLD SOUTHERN RAILROAD	AIRPORT POLICE
RETIRED SHERIFFS OFFICE	SHERIFF DEPARTMENT
DEPUTY SHERIFF	OHIO SHERIFF DEPT
BANK MANAGER/SHERIFF DEPT-RETIRED FROM B	ROSS CO SHERIFF'S DEPARTMENT
CORRECTIONS OFFICER	POLICE DEPARTMENT
RETIRED SHERIFF	GENEVA POLICE DEPART
POLICE OFFICER (CLEVELAND POLICE DEPARTM	WILLIAMS COUNTY SHERIFF DEPARTMENT
RET: CHICAGO POLICE DEPARTMENT	RETIRED STARK COUNTY SHERIFF
Retired police chief	LAW ENFORCEMENT
retired police officer	SPRINGDALE POLICE DEPARTMENT
POLICE OFFICE X 30 YEARS; OR TECH ARMY	LAKE COUNTY SHERIFF DEPT
POLICE SERGEANT	BROOKLYN POLICE DEPT
RETIRED - AKRON POLICE DEPT	law enforcement
RETIRED POLICE DISPATCHER	RETIRED/POLICE DEPARTMENT
POLICE CHIEF	STATE CLAIR POLICE DEPARTMENT
POLICE OFFICER - CITY OF NORTON	LUCAS COUNTY SHERRIF DEPT
POLICE CITY OF COLUMBUS	PATIENT IS A RETIRED POLICE OFFICER.
POLICEMAN - RETIRED	SHERIFF DEPT
SHERIFF DEPUTY	FRANKLIN CO SHERIFF
POLICE-RETIRED	COUNTY SHERIFF
	SHERIFF
	ROSS CO SHERIFF
	BAY VILLAGE POLICE DEPT.
	WILLOWICK POLICE DEPARTMENT

POLICE LIEUTENANT (CITY OF N RIDGEVILLE) POLICE DISPATCHER RETIRED/POLICE FORCE CITY OF WOOSTER POLICE OFFICER 5 years as a policeman VILLAGE OF VERSAILES - POLICE OFFICER POLICEMAN (CLEVELAND) RETIRED/FF COUNTY SHERIFF PATROLMAN POLICE DISP POLICE PATROLMAN RETIRED POLICE OFFICER CLEVELAND POLICEMAN POLICE CHIEF - RETIRED POLICE AND US STEEL RETIRED OFFICER/PEPPER PIKE POLICE DEPT POLICE OFFICER (RETIRED) POLICE OFFICER (CLEVELAND POLICE DEPT) XENIA POLICE DEPT DISPATCHER/BRATENHAL POLICE DEPARTMENT Retired police officer POLICE OFFICER - CITY OF EUCLID POLICE DEPARTMENT POLICE OFFICER AND EMT SHERIFF WORKED IN CHEMICAL PLANT, DEPUTY SHERIFF YOUTH DETENTION OFFICER DEPUTY SHERIFE deputy green county SERGEANT Police Sergeant police officer RETIRED POLICE CHIEF ELECTRICIAN/POLICE OFFICER POLICE DEPT POLICE OFFICER-RET-CLEVELAND POLICE DEPT ATTORNEY (INVACARE) & FORMER POLICE OFFI ATTORNEY (INVACARE) & FORMER POLICE OFFICER Current: POLICE OFFICER RETIRED/COP (SOLON POLICE DEPARTMENT) Police Officer LT. CLEVELAND POLICE	OHIO POLICE & FIRE LAW ENFORCEMENT - POLICE OFFICER RETIRED FROM STATE POLICE WEST JEFFERSON POLICE DEPARTMENT LAKE CO SHERIFF DEPT STRONGSVILLE POLICE DEPT CHIEF OF POLICE POLICE OFFICE SANDUSKY CTY SHERIFF

CMHA POLICE DEPT CITY OF DAYTON-POLICE OFFICER POLICE MAN - CITY OF SHEFFIELD LAKE POLICE OFFICER - RETIRED DEPUTY Cuyahoga County Deputy Sheriff SHERIFF (CUYAHOGA COUNTY OFFICE) RETIRED - SUMMIT COUNTY SHERIFF COUNTY POLICE OFFICER POLICE OFFICER (LORAIN POLICE DEPT) Police Officer - retired RETIRED PERRY TOWNSHIP POLICE OFFICER CAMPUS POLICE MILK MAN-RETIRED, POLICEMAN POLICE SARGENT MENTOR POLICE DEPT (RETIRED) POLICEMAN/CAPTAIN POLICE OFFICER CITY OF SPRINGBORO CARPENTER/HARDWARE STORE OWNER/SHERIFF MEDINA COUNTY SHERIFFS DEPARTMENT SHERIFF RETIRED RETIRED (ERIE COUNTY SHERIFF DEPARTMENT) RETIRED AKRON UNIV POLICE OFFICER RETIRED/CITY OF LANCASTER POLICE DEPT DISABLED POLICEMAN POLICE OFFICER (CITY OF CLEVELAND) POLICE DEPUTY WAYNE COUNTY SHERIFF'S DEPT (DEPUTY) SHERIFF (RETIRED) CLARK COUNTY SHERIFF S OFFICE SHERIFFS DEPUTY CORRECTIONS OFFICER - RETIRED DEPUTY/DETECTIVE STARK CO SHERIFF DEPT POLICEMAN- RETIRED POLICE DISPACHER POLICE OFFICIER RETIRED MILITARY POLICE POLICE CAPTAIN RETIRED/POLICE OFFICER UNEMPLOYED/POLICE KETTERING POLICE DEPT RETIRED POLICE OFFICER - CITY OF CANTON FREMONT POLICE DEPT CITY OF LANCASTER POLICE DEPT	

RETIRED - STARK COUNTY SHERIFF	
SENECA COUNTY SHERIFF OFFICE	
CORRECTION OFCR, SHERIFF	
LAW ENFORCEMENT	
FORMER POLICEMAN	
LIMA POLICE DEPARTMENT - RETIRED	
RETIRED/POLICEMAN	
CHEIF OF POLICE	
POLICEMAN--RETIRED	
LAW ENFORCEMENT OFFICER	
DEPUTY SHERIFF MADISON COUNTY	
MONT CO SHERIFF DEPT	
SUMMIT COUNTY SHERIFF - RETIRED	
NOT EMPLOYED, RETIRED FROM	
SANDUSKY COUNTY SHERIFF OFFICE	
DARKE COUNTY DEPUTY	
CAREER MILITARY/ CLEVELAND	
POLICEMAN	
POLICE DISPATCHER / 911 OPERATOR	
SEGEANT	
RETIRED POLICEMAN, CITY OF	
SPRINGFIELD	
SARGEANT	
POLICE OFFICER FOR WARREN POLICE	
DEPARTM	
RETIRED CONSTRUCTION WORKER AND	
POLICEMA	
RETIRED POLICE	
CHIEF OF POLICE	
RETIRED POLICE/FIRE DISPATCHER	
RETIRED-CITY OF DAYTON POLICEMAN,	
CURRENT PART-TIME SHERIFF BALIFF	
AND SECURITY DAYTON DRAGONS	
POLICE OFFICER/BAILIF	
POLICEMAN/BAILIFF	
RETIRED POLICE	
POLICE OFFICE	
PRIVATE POLICE	
POLICE OFFICER/RETIRED	
POLICE AND MILITARY OFFICER	
RETIRED US NAVY AND RETIRED POLICE	
OFFIC	
RETIRED CINTI POLICE OFFICER	
POLICE CHIEF/RETIRED	
GOVERNMENT POLICE OFFICER	
POLICEMAN (RET)	
POLICE OFFICER (LORAIN POLICE	
DEPARTMENT	
RETIRED POLICEMAN/ NOW WORKS IN	
WAREHOUS	

SUMMIT COUNTY SHERIFF - DEPUTY SHERIFF US ARMY/SHERIFF RETIRED DEPUTY SHERIFF SHERIFF DEPARTMENT WLBY POLICE DEPARTMENT RETIRED, POLICE SERGANT LIEUTENANT QA: RETIRE-POLICE CHIEF RETIRED POLICE OFFICER, ATTORNEY POLICE OFFICE (RETIRED) NOT EMPLOYED, FORMER OHIO POLICE LEUTENANT POLICE OFFICE - RETIRED US MILITARY/POLICE OFFICER POLICE OFFICER-RETIRED NOT EMPLOYED, RETIRED POLICE/FIRE POLICE OFFICER RETIRED POLICE OFFICER - DISABILITY POLICE CHIEFT MILITARY POLICE OFFICER STATE POLICE OFFICER POLICE AND FIREMAN, RETIRED CITY OF SPRINGFIELD-POLICE OFFICER CATAWBA POLICE/ DANS TOWING LIEUTENANT/ POLICE OFFICER WORK INVESTIGATOR/POLICEMAN HURON COUNTY CHIEF DEPUTY SHERIFF MONTGOMERY CTY JAIL DEPUTY SHERIFF PERRY CO SHERIFF OFFICE County Deputy Sheriff CORRECTIONS OFFICER - SHERIFF DEPT RETIRED - MORROW COUNTY SHERIFFS SHERIFF'S DEPUTY DEPUTY SHERIFF, CLARK COUNTY POLICE OFFICER/ MAINTENANCE SYLVANIA TOWNSHIP POLICE RET: POLICE CHIEF POLICE OFFICER/MASTER PLANNER POLICE DETECTIVE POLICE/FIRE/DISPATCH RETIRED POLICEWOMAN RETIRED YO POLICE OFFICER POLICE MAN POLICE OFFICER (ELYRIA) POLICE CAPTAIN (CITY OF CLEVELAND) CCF POLICE OFFICER POLICE LIEUTENANT CHIEF POLICE AMSTERDAM STATE TROOPER	

POLICEMAN/ACCOUNTANT/TEACHER CITY OF HAMILTON-POLICE OFFICER POLICE OFFICER, RETIRED DEPUTY SHERIFF: MORROW COUNTY SHERIFF OFFICE CORRECTION OFFICER/RETIRED DARKE COUNTY SHERIFF DEPT CAPTAIN/DEPUTY SHERIFF HAMILTON COUNTY DEPUTY SHERIFF SANDUSKY COUNTY SHERIFF	